



Syvecs Limited

Syvecs S12

Pinouts and Wiring Info

Support Team  
03-02-2014

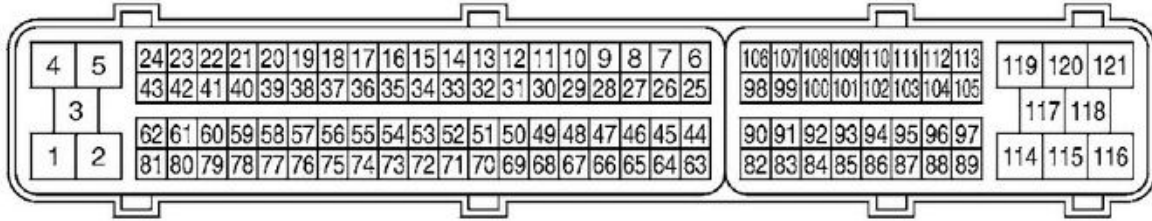
This document intended for use by a technical audience and describes a number of procedures that are potentially hazardous. Installations should be carried out by competent persons only.

Syvecs and the author accept no liability for any damage caused by the incorrect installation or configuration of the equipment.

Please Note that due to frequent firmware changes certain windows might not be the same as the manual illustrates. If so please contact the Syvecs Tech Team for Assistance.

[Support@Syvecs.co.uk](mailto:Support@Syvecs.co.uk)

## Syvecs S12 Pinouts



S12 Pin	Pin Function	Description
1	PWRGND	Ecu Ground
2	IGN01	Ignition (20A Open Collector)
3	IGN02	Ignition (20A Open Collector)
4	IGN03	Ignition (20A Open Collector)
5	IGN04	Ignition (20A Open Collector)
6	IN25	5V Analogue Input
7	KNOCK 4	Knock Sensors
8	KNOCKGND	Knock Sensors
9	THERMO_2 +	k-Type Thermocouple
10	IN21	Thermistor Input
11	IN18	5V Analogue Input
12	IN14	Configurable Analogue Input
13	IN11	Configurable Analogue Input
14	IN07	Configurable Analogue Input
15	IN04	Configurable Analogue Input
16	IN01	Configurable Analogue Input
17	LAM 1 I	Lambda Sensors
18	CAN 2 LO	CAN BUS
19	RS232 TX	RS232
20	LAN RX-	COM CABLE
21	FUEL07	Fuel Injector (10A Open Collector)
22	FUEL03	Fuel Injector (10A Open Collector)
23	VBAT	Voltage Supply
24	PWRGND	Ecu Ground
25	IN26	5V Analogue Input
26	5V OUT	5V OUT
27	KNOCK 1	Knock Sensors
28	THERMO_1 -	k-Type Thermocouple
29	IN22	Thermistor Input
30	IN19	5V Analogue Input
31	IN15	Configurable Analogue Input

32	IN12	Configurable Analogue Input
33	IN08	Configurable Analogue Input
34	ANGND	SENSOR GROUND
35	IN02	Configurable Analogue Input
36	LAM 1 V	Lambda Sensors
37	CAN 3 HI	CAN BUS
38	RS232 RX	RS232
39	LAN RX+	COM CABLE
40	FUEL08	Fuel Injector (10A Open Collector)
41	FUEL04	Fuel Injector (10A Open Collector)
42	VBAT	Voltage Supply
43	PWRGND	Ecu Ground
44	IN27	5V Analogue Input
45	5V OUT	5V OUT
46	KNOCK 2	Knock Sensors
47	THERMO_1 +	k-Type Thermocouple
48	IN23	Thermistor Input
49	IN20	5V Analogue Input
50	IN16	Configurable Analogue Input
51	ANGND	SENSOR GROUND
52	IN09	Configurable Analogue Input
53	IN05	Configurable Analogue Input
54	ANGND	SENSOR GROUND
55	LAM 2 V	Lambda Sensors
56	CAN 3 LO	CAN BUS
57	RS232 GND	RS232
58	CAN 1 HI	CAN BUS
59	LAN TX-	COM CABLE
60	FUEL05	Fuel Injector (10A Open Collector)
61	FUEL01	Fuel Injector (10A Open Collector)
62	HBRIDGE 5	H-Bridge
63	IN28	5V Analogue Input
64	10VOUT	
65	KNOCK 3	Knock Sensors
66	THERMO_2 -	k-Type Thermocouple
67	IN24	Thermistor Input
68	ANGND	SENSOR GROUND
69	IN17	5V Analogue Input
70	IN13	Configurable Analogue Input
71	IN10	Configurable Analogue Input
72	IN06	Configurable Analogue Input
73	IN03	Configurable Analogue Input
74	LAM 2 I	Lambda Sensors
75	LAM GND	Lambda Sensors
76	CAN 2 HI	CAN BUS
77	CAN 1 LO	CAN BUS
78	LAN TX+	COM CABLE
79	FUEL06	Fuel Injector (10A Open Collector)

80	FUEL02	Fuel Injector (10A Open Collector)
81	HBRIDGE 6	H-Bridge
82	HBRIDGE 1	H-Bridge
83	PWM4	PWM
84	PWM8	PWM
85	FUEL12	Fuel Injector (10A Open Collector)
86	FUEL16	Fuel Injector (10A Open Collector)
87	FUEL20	Fuel Injector (10A Open Collector)
88	FUEL24	Fuel Injector (10A Open Collector)
89	VBAT	Voltage Supply
90	HBRIDGE 2	H-Bridge
91	PWM3	PWM
92	PWM7	PWM
93	FUEL11	Fuel Injector (10A Open Collector)
94	FUEL15	Fuel Injector (10A Open Collector)
95	FUEL19	Fuel Injector (10A Open Collector)
96	FUEL23	Fuel Injector (10A Open Collector)
97	PWRGND	Ecu Ground
98	HBRIDGE 3	H-Bridge
99	PWM2	PWM
100	PWM6	PWM
101	FUEL10	Fuel Injector (10A Open Collector)
102	FUEL14	Fuel Injector (10A Open Collector)
103	FUEL18	Fuel Injector (10A Open Collector)
104	FUEL22	Fuel Injector (10A Open Collector)
105	PWRGND	Ecu Ground
106	HBRIDGE 4	H-Bridge
107	PWM1	PWM
108	PWM5	PWM
109	FUEL09	Fuel Injector (10A Open Collector)
110	FUEL13	Fuel Injector (10A Open Collector)
111	FUEL17	Fuel Injector (10A Open Collector)
112	FUEL21	Fuel Injector (10A Open Collector)
113	PWRGND	Ecu Ground
114	IGN05	Ignition (20A Open Collector)
115	IGN06	Ignition (20A Open Collector)
116	IGN07	Ignition (20A Open Collector)
117	IGN08	Ignition (20A Open Collector)
118	IGN09	Ignition (20A Open Collector)
119	IGN10	Ignition (20A Open Collector)
120	IGN11	Ignition (20A Open Collector)
121	IGN12	Ignition (20A Open Collector)

Pins Used

TE - 964273-2 - <https://www.te.com/usa-en/product-964273-2.html>

TE - 968221-1 - <https://www.te.com/usa-en/product-968221-1.html>

## General Connections

### Connecting Power

The ECU has two power feeds, which can either be used to provide a redundant multiple feeds, or as a way of providing switched power to additional loads through the loom.

#### Example Schematic

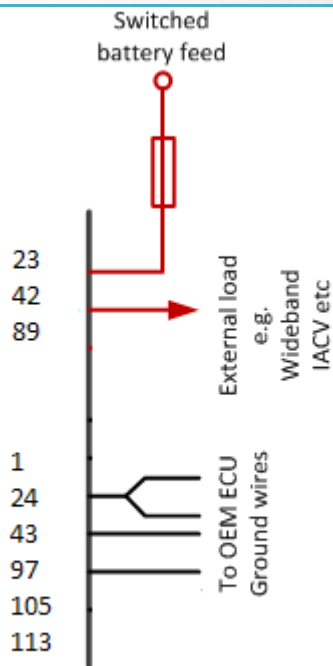


Figure 0-1 - Redundant Power Feeds and a Common grounding point.

### Pin Schedule

Pin Number	Function	Notes
23	VBAT	Use a fused Switched feed.
42	VBAT	Use a fused Switched feed.
89	VBAT	Use a fused Switched feed.
1	Power Ground	Up to 2 ground wires can be paired to this pin.
24	Power Ground	Up to 2 ground wires can be connected to this pin.
43	Power Ground	Up to 2 ground wires can be paired to this pin.
97	Power Ground	Up to 2 ground wires can be paired to this pin.
105	Power Ground	Up to 2 ground wires can be paired to this pin.
113	Power Ground	Up to 2 ground wires can be paired to this pin.

**NOTE!** Power Grounds are designed to conduct High Current loads – Do not mix Power Grounds with Analogue (AN) Grounds.

## LAN Connection

Connection from the S12 to a Laptop/PC uses a Male RJ45 plug, wired in cross over configuration.

### Example Schematic

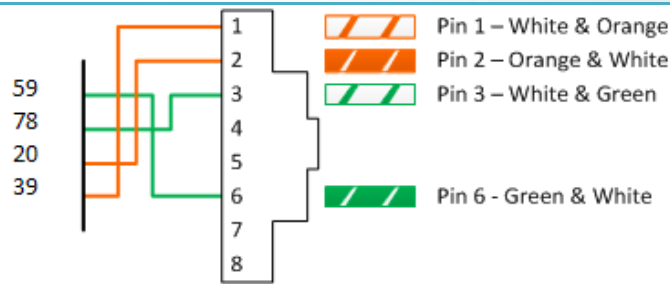


Figure 0-2 RJ45 Wiring

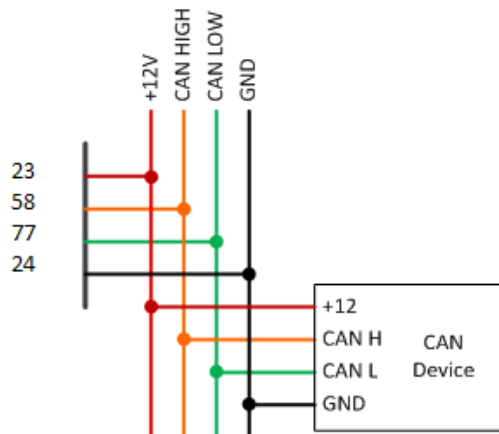
### Pin Schedule

Pin Number	Function	Notes
59	LAN Transmit -	RJ45 Pin 6 – Green & White wire
78	LAN Transmit +	RJ45 Pin 3 – White & Green wire
20	LAN Receive -	RJ45 Pin 2 – Orange & White wire
39	LAN Receive +	RJ45 Pin 1 – White & Orange wire

## CAN Bus

Common Area Network Bus (CAN Bus) is a widely used data interface common used in many cars and aftermarket accessories (such as Stack Data loggers and Dashes). Data is sent using the High and Low wires, which are maintained as a twisted pair. The S12 has 3 Can Buses

### Example Schematic



**NOTE:** CAN Wires must be kept as a twisted pair.

Pin Number	Function	Notes
58	CAN HIGH1	Check OEM Colour pairing.
77	CAN LOW1	Ensure wires are twisted pair.
76	CAN HIGH2	Check OEM Colour pairing.
18	CAN LOW2	Ensure wires are twisted pair.
37	CAN HIGH3	Check OEM Colour pairing.
56	CAN LOW3	Ensure wires are twisted pair.

## RS232

Telemetry can data can be provided via RS232.

### Example Schematic

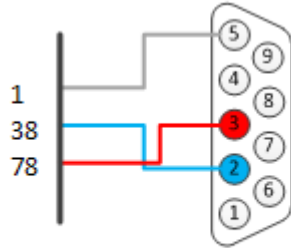


Figure 0-3 RS232 Connection

### Pin Schedule

Pin Number	Function	Notes
57	Pwr GND	DB-9 pin 5
38	Rx	DB-9 pin 2
19	Tx	DB-9 pin 3

## Input Connections

### Sensor/ Analogue Grounds (AN Grounds)

Sensors and miscellaneous analogue inputs have their own Ground pins; these grounds must be kept separate from the Power grounds shown in the first section. As there are four ground pins you may have to connect multiple grounds to some of the pins if you have more than four sensors.

### Pin Schedule

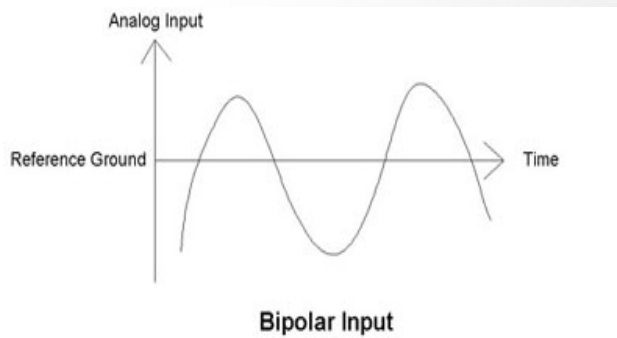
Pin Number	Function	Notes
34	ANGND1	
51	ANGND2	
54	ANGND1	
68	ANGND2	

## Assigning Inputs

The Syvecs S12 has programmable inputs available and although they are fully configurable in Scal, they are not all the same type of input which means sensors that for example require a pull up, have to assigned to different types..... Listed below are the 4 types which are available.

### Bipolar Inputs

These Inputs are able to swing above and below the reference ground meaning they can see Positive Voltage as well as Negative.



Example of sensors normally used on these Inputs are:

- Reluctor Crank and Cam Sensors
- ABS Sensors for wheel speed

Bipolar inputs are not just limited to the above they can also be used for any sensor that outputs 0-5volts. They are also able to provide a Pull-up through Scal

Pin Number	Scal Assignment	Notes
16	An01	47K Pull-up Option
35	An02	3k Pull-up Option
73	An03	3k Pull-up Option
15	An04	3k Pull-up Option
53	An05	3k Pull-up Option
72	An06	3k Pull-up Option
14	An07	3k Pull-up Option
33	An08	3k Pull-up Option
52	An09	3k Pull-up Option
71	An10	3k Pull-up Option
13	An11	3k Pull-up Option
32	An12	3k Pull-up Option
70	An13	3k Pull-up Option
12	An14	3k Pull-up Option
31	An15	3k Pull-up Option
50	An16	3k Pull-up Option



## Voltage Inputs

These Inputs are able to sense a Voltage level which is linear and does not swing

Example of sensors normally used on these Inputs are:

- Manifold Pressure sensors
- Throttle Positions
- Oil Pressures

Voltage Inputs are not just limited to the above then can also be used for any sensor which outputs a 0-5volt signal but NOT able to provide a pull up.

Pin Number	Scal Assignment	Notes
69	An17	
11	An18	
30	An19	
49	An20	
6	An25	
25	An26	
44	An27	
63	An28	

## Resistive Inputs

These Inputs are the same as voltage inputs in which they can accept a 0-5v but they have a fixed 3k 5v Pull up fitted

.Example of Sensors normally used on these Inputs are:

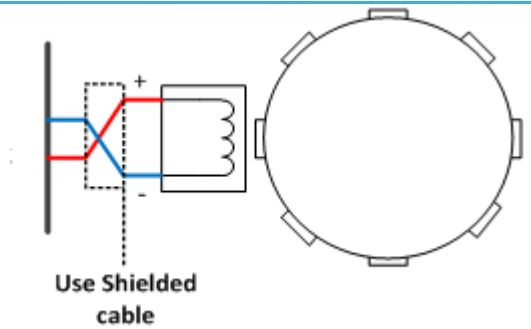
- Temperature sensors
- Calibration switches

Pin Number	Scal Assignment	Notes
10	An21	
29	An22	
48	An23	
67	An24	

## Sensor Schematics - Examples

### Crank Sensor – Magnetic Type

#### Example Schematic

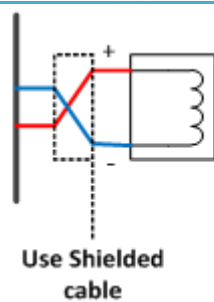


#### Pin Schedule

Pin Number	Function	Notes
74	ANGND1	Crank Sensor – (Shared with Cam Sensor)
35	Bipolar Input	Crank Sensor+

### Cam Sensors – Magnetic Type

#### Example Schematic

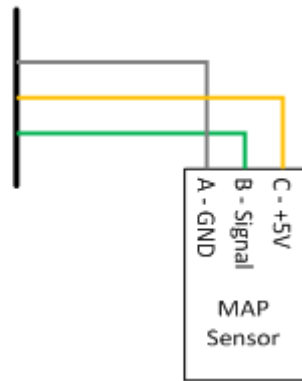


#### Pin Schedule

Pin Number	Function	Notes
34	ANGND1	Cam Sensor – (Shared with Crank Sensor)
15	Bipolar input	Cam Sensor +

## Manifold Pressure Sensor (MAP)

### Example Schematic

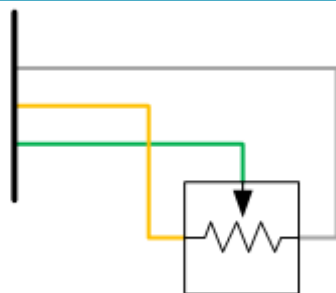


### Pin Schedule

Pin Number	Function	Notes
34	ANGND1	May be shared with multiple sensors
26	5VOUT1	Regulated sensor power supply
30	Voltage Input	Can use Bipolar, Unipolar or Voltage inputs

## Throttle Position Sensor (TPS)

### Example Schematic

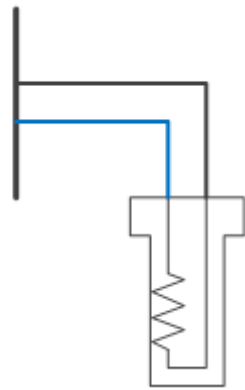


### Pin Schedule

Pin Number	Function	Notes
34	ANGND1	May be shared with multiple sensors
26	5VOUT1	Regulated sensor power supply
69	Voltage Input	Can use Bipolar, Unipolar or Voltage inputs

## Coolant Temperature Sensor (CTS)

### Example Schematic

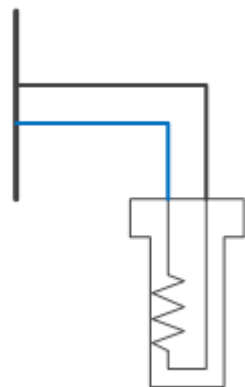


### Pin Schedule

Pin Number	Function	Notes
68	ANGND1	May be shared with multiple sensors
29	Resistive Input	Can use Resistive inputs #1 to #4 (pins 63 to 66)

## Inlet Air Temperature Sensor (IAT)

### Example Schematic

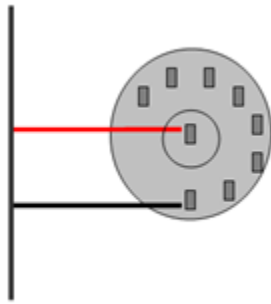


### Pin Schedule

Pin Number	Function	Notes
68	ANGND1	May be shared with multiple sensors
10	Resistive Input	Can use Resistive inputs #1 to #4 (pins 63 to 66)

## Calibration Switches

### Example Schematic

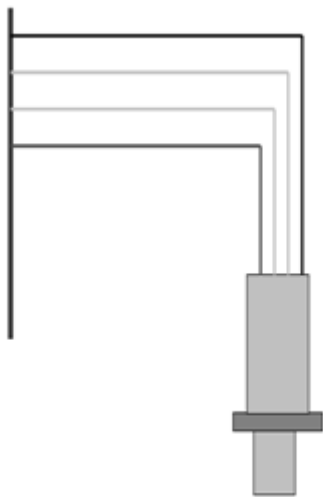


### Pin Schedule

Pin Number	Function	Notes
68	ANGND1	May be shared with multiple sensors
48	Resistive Input	Can use Resistive inputs #1 to #4 (pins 63 to 66) Cal Switches Require Pull Up to be On

## Narrowband Lambda Sensor

### Example Schematic



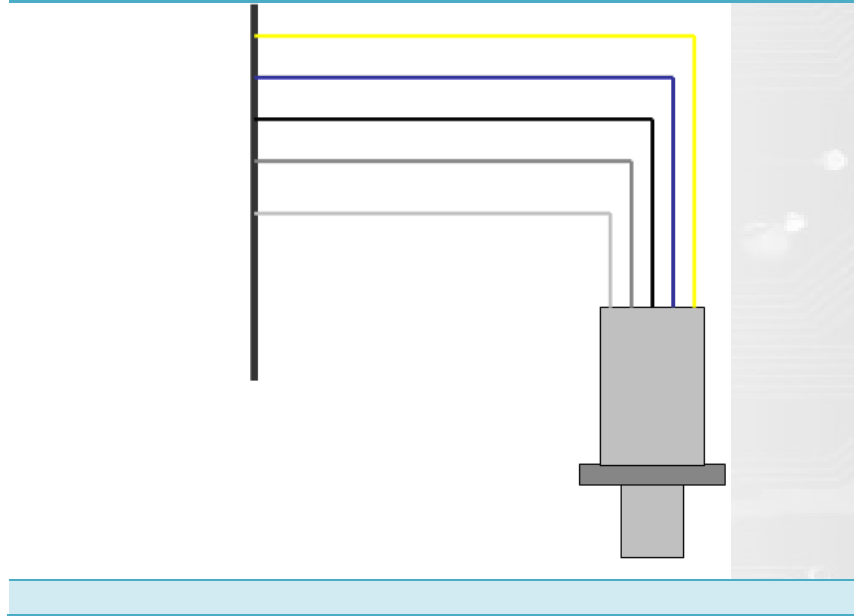
### Pin Schedule

Wire Colour	Function	Pins Usable on S12
White	Heater	23, 42
White	Heater Drive	Any FUEL Output – Needs to be assigned in Scal on I/O Configuration
Black	Signal Ground	75
Grey	Lambda Signal	Can use Bipolar, Unipolar or Voltage inputs

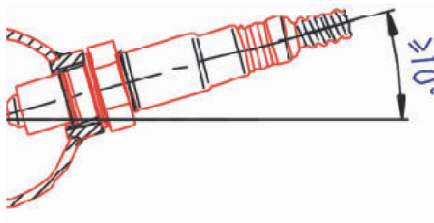
## Wideband Lambda Sensor

The Syvecs S12 has the ability to drive a NTK Wideband and Bosch LSU 4.2/4.9.

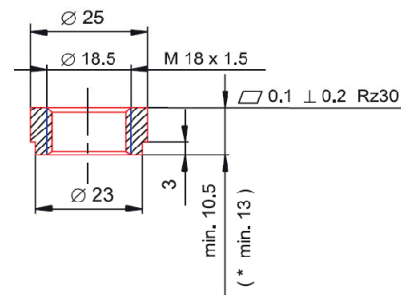
### Example Schematic



### Mounting recommendation



Recommended materials for the mating thread in the exhaust pipe  
\*: THexagon > 600°C or  
TGas > 930°C



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### NTK L1H1

Lambda Sensor Input in Scal - Pin assignments needs to be Set to Lam1V or Lam2v, Lambda Heater Needs to be assigned to a Fuel Output

Lambda Pin Number	Colour	Name	S12 Pin
1	Yellow	Heater	23, 42
2	Orange	Heater Drive	Any Fuel or Pwm
6	Red	Nernst Cell Voltage	36, 55
7	White	Ion Pump Current	17, 74
8	Black	Signal Ground	75

### NTK L2H2

Lambda Sensor Input in Scal - Pin assignments needs to be Set to Lam1V or Lam2v, Lambda Heater Needs to be assigned to a Fuel Output

Lambda Pin Number	Colour	Name	S12 Pin
1	Yellow	Heater	23, 42
2	Blue	Heater Drive	Any Fuel or Pwm
6	Grey	Nernst Cell Voltage	36, 55
7	White	Ion Pump Current	17, 74
8	Black	Signal Ground	75

### BOSCH LSU4.2

Lambda Sensor Input in Scal - Pin assignments needs to be Set to Lam1V or Lam2v, Lambda Heater Needs to be assigned to a Fuel Output

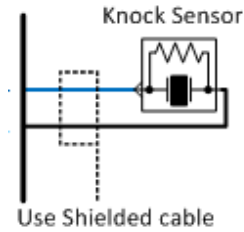
Lambda Pin Number	Colour	Name	S12 Pin
1	Black	Nernst Cell Voltage	36, 55
2	Green	Cal Resistor	
3	Grey	Heater 12v	23, 42 or 12v
4	White	Heater Drive	Any Fuel or Pwm
5	Yellow	Signal Ground	75
6	Red	Ion Pump Current	17, 74

### BOSCH LSU4.9

Lambda Pin Number	Colour	Name	S12 Pin
1	Red	Ion Pump Current	17, 74
2	Yellow	Signal Ground	75
3	White	Heater Drive	Any Fuel or Pwm
4	Grey	Heater 12v	23, 42 or 12v
5	Green	Cal Resistor	
6	Black	Nernst Cell Voltage	36, 55

### Knock Sensor

Syvecs S12 has two Knock inputs for a piezoelectric Example Schematic



### Pin Schedule

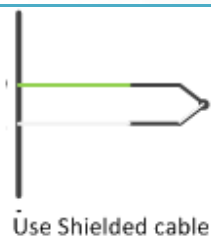
Pin Number	Function	Notes
27	Knock 1 Signal	
46	Knock 2 Signal	
65	Knock 3 Signal	
7	Knock 4 Signal	
8	Knock Ground	

**NOTE:** Shield wires should be connected only at one end, common practice is to join shielding wires at the ECU end of the loom and connect them to a Power Ground wire.

### EGT/Thermocouple

Syvecs S12 has 2 K-type thermocouple inputs.

### Example Schematic



### Pin Schedule

Pin Number	Function	Notes
47	THER+1	Green wire (K-type)
28	THER-1	White wire (K-type)
9	THER+2	Green wire (K-type)
66	THER-2	White wire (K-type)



## Driven/Output Connections

### Ignition

The ignition channels are logic level outputs and IGBT designed to control ignition coils via an additional igniter (Power transistor) or Direct. These outputs can be used to drive up to 10A Peak / 5A Continuous if driving a IGBT Coil, 40ma is TTL

Adjusting the Ignition Output control is found under I/O Configuration in Scal

### Pin Schedule

Pin Number	Function	Notes
2	IGN1	Logic Level (5V) output OR IGBT
3	IGN2	Logic Level (5V) output OR IGBT
4	IGN3	Logic Level (5V) output OR IGBT
5	IGN4	Logic Level (5V) output OR IGBT
114	IGN5	Logic Level (5V) output OR IGBT
115	IGN6	Logic Level (5V) output OR IGBT
116	IGN7	Logic Level (5V) output OR IGBT
117	IGN8	Logic Level (5V) output OR IGBT
118	IGN9	Logic Level (5V) output OR IGBT
119	IGN10	Logic Level (5V) output OR IGBT
120	IGN11	Logic Level (5V) output OR IGBT
121	IGN12	Logic Level (5V) output OR IGBT

### Fuel Outputs

The Injection channels on the S12 are able to Drive High Impedence injectors Only. When using Low Impedence injectors we suggest a Ballast pack or use our 6 Channel Peak and Hold Driver.

Fuel Outputs also have full pulse width modulation available. These outputs can be used to drive up to 10A Peak / 5A Continuous and can only pull to ground.

### Pin Schedule

Pin Number	Function	Notes
61	Fuel1	Injector Output or PWM
80	Fuel2	Injector Output or PWM
22	Fuel3	Injector Output or PWM
41	Fuel4	Injector Output or PWM
60	Fuel5	Injector Output or PWM
79	Fuel6	Injector Output or PWM
21	Fuel7	Injector Output or PWM
40	Fuel8	Injector Output or PWM
109	Fuel9	Injector Output or PWM
101	Fuel10	Injector Output or PWM
93	Fuel11	Injector Output or PWM
85	Fuel12	Injector Output or PWM
110	Fuel13	Injector Output or PWM
102	Fuel14	Injector Output or PWM
94	Fuel15	Injector Output or PWM
86	Fuel16	Injector Output or PWM
111	Fuel17	Injector Output or PWM
103	Fuel18	Injector Output or PWM
95	Fuel19	Injector Output or PWM
87	Fuel20	Injector Output or PWM
112	Fuel21	Injector Output or PWM
104	Fuel22	Injector Output or PWM
96	Fuel23	Injector Output or PWM
88	Fuel24	Injector Output or PWM

## PWM Outputs

The PWM channels on the S12 are able to drive PWM based Devices like Wastegate solenoid, relays etc . These outputs can be used to drive up to 10A Peak / 5A Continuous

### Pin Schedule

Pin Number	Function	Notes
107	Pwm1	PWM
99	Pwm2	PWM
91	Pwm3	PWM
83	Pwm4	PWM
108	Pwm5	PWM
100	Pwm6	PWM
92	Pwm7	PWM
84	Pwm8	PWM

## Half Bridge Outputs

An **H bridge** is an electronic circuit that enables a voltage to be applied across a load in either direction. These circuits are often used to drive Electronic Throttle bodies applications to allow DC motors to run forwards and backwards.

Half Bridge Outputs also have full pulse width modulation available and can be driven to 12v or Ground

These outputs can be used to drive up to 10A Peak / 5A Continuous

### Pin Schedule

Pin Number	Function	Notes
82	H-Bridge1	Can be driven to 12v or Ground
90	H-Bridge2	Can be driven to 12v or Ground
98	H-Bridge3	Can be driven to 12v or Ground
106	H-Bridge4	Can be driven to 12v or Ground
62	H-Bridge5	Can be driven to 12v or Ground
81	H-Bridge6	Can be driven to 12v or Ground